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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/028,433	12/28/2001	Young-Sang Byun	3430-0175P	4398
2292	7590	08/08/2005	EXAMINER	
BIRCH STEWART KOLASCH & BIRCH			DUONG, THOI V	
PO BOX 747			ART UNIT	PAPER NUMBER
FALLS CHURCH, VA 22040-0747			2871	

DATE MAILED: 08/08/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

AK

**Office Action Summary**

Application No.

10/028,433

Applicant(s)

BYUN ET AL.

Examiner

Thoi V. Duong

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 03 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 11 May 2005.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1,2,4,6-10 and 12-16 ~~is~~/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,2,4,6-10 and 12-16 ~~is~~/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on April 11, 2005 has been entered.

Accordingly, claims 1, 9 and 10 were amended, and claims 3, 5 and 11 were cancelled. Currently, claims 1, 2, 4, 6-10 and 12-16 are pending in this application.

### ***Claim Objections***

2. Claim 6 is objected to because of the following informalities: claim 6 is dependent on claim 5 which was cancelled. Appropriate correction is required.

### ***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1, 2 and 4-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over von Gutfeld et al. (von Gutfeld, USPN 6,055,035) in view of Gyoda (Pub. No. US 2002/0063842 A1).

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Re claim 1, as shown in Figs. 2A, 2B and 3, von Gutfeld discloses a method of forming a liquid crystal layer on a substrate 1A having a sealed pattern (col. 7, lines 24-27), comprising:

preparing a liquid crystal material in a projecting portion 20 having a nozzle plate 21 containing a plurality of orifices 21;

applying a pressure to the projecting portion so as to emit the liquid crystal material simultaneously from the plurality of orifices 21 (col. 5, lines 11-65);

moving the substrate 1A in one direction (col. 6, lines 8-14); and

depositing the liquid crystal material emitted simultaneously from the plurality of orifices uniformly onto the substrate during the movement of the substrate in the one direction and applying a voltage to the projecting portion to adjust the volume of the emitted liquid crystal material according to a position of the moving substrate (Fig. 2B and col. 5, lines 50-58),

wherein, re claim 2, said nozzle plate adjusts the applied pressure for emitting the liquid crystal material (col. 5, lines 50-58 and col. 7, lines 47-55);

wherein, re claim 4, the liquid crystal material is emitted and deposited in a vacuum chamber 60 (Figs. 6 and 7, and col. 7, lines 36-55); and

wherein, as shown in Figs. 2B and 3, the volume of the emitted liquid crystal material is adjusted by a CPU 25 to obtain the correct a correct amount of the liquid crystal material deposited on the panel 1A according to a position of the nozzle plate 21 or the moving substrate (col. 5, line 50 through col. 6, line 14).

Accordingly, re claim 15, it is obvious that the CPU 25 is operated by an on-off of a voltage according to a position of the nozzle plate 21 or the moving substrate so as to allow a uniform amount of the liquid crystal material to be ejected through the nozzle plate (col. 5, line 50 through col. 6, line 14).

Von Gutfeld discloses a method of forming a liquid crystal layer on a substrate that is basically the same as that recited in claim 1 except for applying a vibration and pressure to the projecting portion to emit the liquid crystal material from the projection portion so as to emit the liquid crystal material simultaneously from the plurality of orifices, said vibration being generated from a resonator overlapping the plurality of orifices.

As shown in Figs. 4, 6 and 7, Gyoda discloses a method of forming a liquid crystal layer 13 on a counter substrate 112A having a sealed pattern 14A, comprising (paragraphs 108-110, page 9):

applying a vibration and pressure to a projecting portion 50 (ink-jet nozzle) so as to emit a liquid crystal material 61 from the projecting portion,

wherein, said vibration is generated from a resonator comprising a plurality of piezoelectric elements 59, each piezoelectric element overlaps an orifice 57 (nozzle aperture); accordingly, the plurality of the piezoelectric elements 59 of the resonator overlap the plurality of orifices 57.

Re claim 6, the generated vibration is transmitted to the projecting portion through a resonating plate 52.

Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the method of forming a liquid crystal layer on a substrate of von Gutfeld with the teaching of Gyoda by employing the ink-jet application method for applying a vibration and pressure to the projection portion to discharge the liquid crystal material with high accuracy (page 8, paragraph 107).

5. Claims 9, 10, 12-14 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gyoda (Pub. No. US 2002/0063842 A1) in view of von Gutfeld et al. (von Gutfeld, USPN 6,055,035) and Hashimoto et al. (USPN 6,583,848 B2).

Re claims 9 and 10, Gyoda discloses an apparatus of forming a liquid crystal layer on a substrate having a seal pattern as shown in Figs. 6 and 7, comprising (paragraphs 108-110, page 9):

a projecting portion 50 having a nozzle plate 51 containing a nozzle aperture 57 for emitting a liquid crystal material 61;

a resonator 59 comprising a plurality of piezoelectric elements 59, each piezoelectric element overlaps an orifice 57 (nozzle aperture) for generating a vibration; accordingly, the plurality of the piezoelectric elements 59 of the resonator overlap the plurality of orifices 57; and

a resonating plate 52 for transmitting the vibration to the projecting portion.

wherein the nozzle plate 51 adjusts the applied pressure for emitting the liquid crystal material (paragraph 108); and

wherein a voltage is applied to the resonator to adjust the volume of the emitted liquid crystal material (paragraph 109).

Re claim 14, voltage means are provided for generating vibration in the resonator (paragraph 109).

Re claim 13, the apparatus further comprises a vacuum chamber for encompassing the projecting portion, the resonator and the resonating plate (paragraph 98, page 8).

Gyoda discloses an apparatus of forming a liquid crystal layer on a substrate having a seal pattern that is basically the same as that recited in claim 9 except for a nozzle plate containing a plurality of orifices simultaneously emitting a liquid crystal material and a stage for moving the substrate in one direction during continuously emitting of the liquid crystal material simultaneously from the projecting portion uniformly onto the substrate.

At first, as shown in Figs. 2A and 2B, von Gutfeld discloses a projecting portion having a nozzle plate 21 containing a plurality of orifices simultaneously emitting a liquid crystal material (col. 5, lines 11-65),

wherein, as shown in Figs. 2B and 3, the volume of the emitted liquid crystal material is adjusted by a CPU 25 to obtain the correct a correct amount of the liquid crystal material deposited on the panel 1A according to a position of the nozzle plate 21 or the moving substrate; accordingly, it is obvious that the CPU 25 is operated by an on-off of a voltage according to a position of the nozzle plate 21 or the moving substrate so as to allow a uniform amount of the liquid crystal material to be ejected through the nozzle plate (col. 5, line 50 through col. 6, line 14).

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Further, as shown in Figs. 12-15, Hashimoto et al. discloses a manufacturing apparatus of a liquid crystal device having:

a stage 31 used for mounting a substrate 21a; and

re claims 12 and 16, a driving mechanism comprising a driving source 36 for driving the stage and a position detector 37 (a photosensor or a limit switch) for sending a control signal to the driving source 37 (col. 13, lines 45-53 through col. 14, lines 12-15). Accordingly, it is obvious that the driving source is operated by a voltage which is adjusted on or off in accordance with a control signal from the position detector used to detect a position of the moving substrate mounted on the stage.

Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the apparatus for forming a liquid crystal layer on a substrate having a seal pattern of Gyoda with the teachings of von Gutfeld and Hashimoto by providing a nozzle plate containing a plurality of orifices simultaneously emitting a liquid crystal material to allow a uniform amount of liquid crystal material per unit area to be ejected on the substrate (von Gutfeld, col. 5, lines 30-37) and a stage for moving the substrate in one direction during emitting of the liquid crystal material simultaneously from the projecting portion uniformly onto the substrate and means for moving the stage, wherein an on-off of a voltage applied to the apparatus is adjusted according to a position of the moving substrate so as to produce a mass-production of liquid crystal display devices (Hashimoto, col. 3, lines 13-1).

6. Claims 7 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over von Gutfeld et al. (von Gutfeld, USPN 6,055,035) in view of Gyoda (Pub. No. US



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2002/0063842 A1) as applied to claims 1, 2 and 4-6 and further in view of Masazumi et al. (Masazumi, USPN 6,331,884 B1).

The method of forming a liquid crystal layer of von Gutfeld as modified in view of Gyoda above includes all that is recited in claims 7 and 8 except for forming a black matrix under the sealed pattern, wherein the liquid crystal material start and stop is deposited on the black matrix.

As shown in Fig. 5, Masazumi discloses a black matrix 8 (black light absorbing layer) formed under a sealed pattern 9b' (col. 16, lines 18-23), wherein a liquid crystal material 9a, 9a', 9a'' start and stop is deposited on the black matrix.

Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to further modify the method of von Gutfeld with the teaching of Masazumi by formed a black matrix under a sealed pattern for enabling display of a black which is background color when the liquid crystal is transparent (col. 10, lines 1-10).

### ***Response to Arguments***

7. Applicant's arguments filed April 11, 2005 have been fully considered but they are not persuasive.

Applicant argued that Gyoda does not teach the vibration being generated from a resonator overlapping the plurality of orifices. The Examiner disagrees since, as shown in Fig. 6, the resonator of the ink-jet nozzle 50 of Gyoda comprises a plurality of piezoelectric elements 59, wherein each element is interposed between a pair of electrodes 60 for voltage application and each element overlaps an orifice 57 (nozzle

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aperture) (Fig. 7); accordingly, the plurality of piezoelectric elements 59 of the resonator of the ink-jet nozzle 50 overlap the plurality of orifices 57 and each element is obviously a part of the resonator since each performs the same function to create vibration when the voltage applied to the pair of electrodes 60 (page 9, paragraph 109). Thus, Gyoda does teach the vibration being generated from a resonator overlapping the plurality of orifices.

***Conclusion***

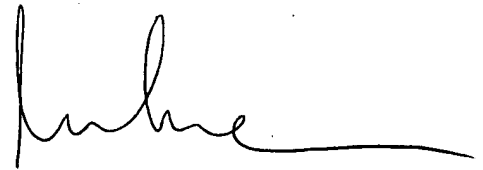
8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thoi V. Duong whose telephone number is (571) 272-2292. The examiner can normally be reached on Monday-Friday from 8:30 am to 4:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert Kim, can be reached at (571) 272-2293.

Thoi Duong



07/29/2005



**DUNG T. NGUYEN**  
**PRIMARY EXAMINER**